CLAIMS

WE CLAIM:

1. A method of modeling a condition of an elevator tensile support, comprising;

determining a rate of degradation of the tensile support for a selected load;

modeling a configuration of at least one selected elevator system;

estimating an elevator traffic pattern;

determining sheave contact and load information using the determined rate of degradation, the modeled configuration and the estimated traffic pattern; and

determining a mean degradation of the tensile support from the determined sheave contact and load information.

2. The method of claim 1, including determining a plurality of mean degradation values by varying at least one of the modeled configuration or the estimated elevator traffic pattern.

3. The method of claim 1, including determining a relationship between an electrical characteristic and a selected condition of the tensile support and using the determined relationship and the determined mean degradation for determining an apparent electrical characteristic value corresponding to the selected condition of the tensile support.

4. The method of claim 3, including repeatedly performing the steps of claim 3 to determine a plurality of the apparent electrical characteristic values and using the values to determine a relationship between a corresponding measured electrical characteristic and a condition of a tensile support.

5. The method of claim 4, wherein the electrical characteristic is resistance.

6. The method of claim 5, including subsequently measuring a resistance of a tensile support and using the determined relationship between resistance and the selected condition of the tensile support to determine a current condition of the tensile support.

7. The method of claim 1, including

generating a first map from the determined mean degradation;

generating a second map correlating an electrical characteristic with a selected degree of strength degradation;

combining the first and second maps to generate a third map correlating the electrical characteristic with the remaining strength in the tensile support.

8. The method of claim 7, wherein the step of generating the first map comprises incorporating at least one tensile support operational factor with the strength loss model.

9. The method of claim 8, wherein said at least one tensile support operational factor is selected from the group consisting of an elevator system configuration, estimated elevator traffic, actual elevator usage, and sheave contact.

10. The method of claim 9, wherein said at least one tensile support operational factor is the actual elevator usage, and wherein the step of generating the first map further comprises repeating the correlating step based on an updated actual elevator usage.

11. The method of claim 7, wherein the combining step comprises:

generating an intermediate map that correlates the electrical characteristic with remaining strength in a segment of the tensile support, wherein the tensile support comprises a plurality of segments; and

summing the remaining strengths of the plurality of segments to generate the third map.

12. The method of claim 7, comprising incorporating a degradation rate variance factor in the first map.

13. The method of claim 7, comprising incorporating an electrical characteristic variance factor in the second map.

14. The method of claim 7, comprising incorporating at least one of a temperature-induced variance factor and an electronic device variance factor to generate the third map.

15. The method of claim 7, wherein the electrical characteristic is resistance.

16. A system for determining a condition of an elevator tensile support, comprising:

a device for measuring an electrical characteristic of at least a portion of the tensile support; and

a controller that relates the measured characteristic to a predetermined data set indicating a relationship between corresponding apparent characteristic values and conditions of the tensile support and determines a current condition of the tensile support.

17. The system of claim 16, wherein the controller

determines a rate of degradation of the tensile support for a selected load;

models a configuration of at least one selected elevator system;

estimates an elevator traffic pattern;

determines sheave contact and load information using the determined rate of degradation, the modeled configuration and the estimated traffic pattern; and

determines a mean degradation of the tensile support from the determined sheave contact and load information.

18. The system of claim 17, wherein the controller determines a relationship between an electrical characteristic and a selected condition of the tensile support and uses the determined relationship and the determined mean degradation for determining an apparent electrical characteristic value corresponding to the selected condition of the tensile support.

19. The system of claim 18, wherein the controller determines a plurality of the apparent electrical characteristic values and uses those values to determine a relationship between a corresponding measured electrical characteristic and a condition of a tensile support.

20. The system of claim 16, wherein the electrical characteristic is resistance.

21. A controller useful for determining a condition of an elevator tensile support, comprising:

programming for determining a rate of degradation of the tensile support for a selected load;

modeling a configuration of at least one selected elevator system;

estimating an elevator traffic pattern;

determining sheave contact and load information using the determined rate of degradation, the modeled configuration and the estimated traffic pattern; and

determining a mean degradation of the tensile support from the determined sheave contact and load information.

22. The controller of claim 21, including programming for determining a plurality of mean degradation values by varying at least one of the modeled configuration or the estimated elevator traffic pattern.

23. The controller of claim 21, including programming for determining a relationship between an electrical characteristic and a selected condition of the tensile support and using the determined relationship and the determined mean degradation for determining an apparent electrical characteristic value corresponding to the selected condition of the tensile support.

24. The controller of claim 23, including programming for determining a plurality of the apparent electrical characteristic values and using the values to determine a relationship between a corresponding measured electrical characteristic and a condition of a tensile support.